

**REMARKS**

The abstract and specification have been extensively amended in order to correct grammatical and idiomatic errors contained therein. The undersigned hereby certifies, to the best of his knowledge and belief, that no new matter has been added.

In order to expedite the prosecution of the present application, Claims 1 and 5 have been canceled and replaced by newly added Claims 6 and 7 respectively. No new matter has been added. Support for newly presented Claims 6 and 7 is found in the Example and Figures 1 and 2 of the present specification. No new matter has been added.

Claims 1-4 have been rejected under 35 USC 103(a) as being unpatentable over Lloyd in view of Ichiki et al. Claim 5 has been rejected under 35 USC 103(a) as being unpatentable over Lloyd in view of Mahler et al. Applicant respectfully traverses these grounds of rejection and urges reconsideration in light of the following comments.

Newly presented Claim 6 is directed to a method for clarifying a sludge which comprises the steps of recovering a discharged waste sludge, separating the discharged waste sludge into a solids fraction and a liquid fraction in a solid-liquid separation unit, recovering the liquid fraction from the solid-liquid separation unit, passing the recovered liquid fraction through a first filtration apparatus to obtain a first filtrate and a first solids residue, recovering the first filtrate from the first filtration apparatus, simultaneously ozonizing the first filtrate and irradiating the first filtrate directly with a specific ray to obtain a first treated liquid, recovering the first treated liquid, passing the first treated liquid through a second filtration apparatus to obtain a second filtrate and a second solids residue, recovering the second filtrate from the second filtration apparatus, simultaneously ozonizing the second filtrate and irradiating the second filtrate directly with the

specific ray to obtain a second treated liquid, recovering the second treated liquid and passing the second treated liquid through a third filtration apparatus to obtain a product liquid.

The present invention is also directed to a system for clarifying a sludge which comprises a solid-liquid separation unit for separating a discharged waste sludge into a solids fraction and a liquid fraction, a first filtration apparatus for separating the liquid fraction into a first filtrate and a first solids residue, a first treatment apparatus for simultaneously ozonizing the first filtrate and irradiating the first filtrate directly with a specific ray to obtain a first treated liquid, a second filtration apparatus for separating the first treated liquid into a second filtrate and a second solids residue, a second treatment apparatus for simultaneously ozonizing the second filtrate and irradiating the second filtrate directly with the specific ray to obtain a second treated liquid and a third filtration apparatus for separating the second treated liquid into a product liquid and a third solids residue. The first and second treatment apparatuses each comprise specific ray lamps provided parallel to each other and a guide plate for flowing the first and second filtrates in a spiral manner between the specific ray lamps.

As discussed in the present specification, the present invention provides a method for clarifying sludge, including a waste discharge from a domestic animal farm, which can provide potable water without the use of chemicals and in an unexpectedly expeditious and cost-effective manner. In the present invention, the generated solids can be used as an organic fertilizer or as a soil conditioner and the separated liquids are simultaneously treated by ozone and irradiated directly with a specific ray, such as near-ultraviolet rays and ultraviolet rays, to produce the treated liquid. Moreover, by conducting a first and second treatment in series, the treatment time can be shortened, the clarification

ratio increased and the treating capacity improved. It is respectfully submitted that the prior art cited by the Examiner does not disclose the presently claimed invention.

The Lloyd reference discloses a method and device for treating waste from animal husbandry sites that is a closed loop system which yields water with greatly reduced carbon and nitrogen levels. After nitrogen removal, the effluent stream is treated for the removal of pathogens and ozone treatment is disclosed as being an effective pathogen removal process. However, as admitted by the Examiner, this reference does not disclose the simultaneous treatment of a liquid with ozone and specific rays, let alone performing the treatment twice to obtain unexpectedly superior benefits. Therefore, the secondary reference cited by the Examiner must provide the motivation to one of ordinary skill in the art to modify Lloyd in a manner that would yield the presently claimed invention.

The Ichiki et al reference discloses a method and apparatus for decoloring barn drainage by ultraviolet rays. This reference discloses an ultraviolet electric discharge lamp having a mercury emission spectrum of 185-254nm arranged in a tank which receives a treatment water. The lamp emits ultraviolet rays to decompose and decolor a polymer contained in the barn drainage as a coloring substance. An outer tube is provided on the periphery of the lamp and oxygen or air is injected between the lamp and the outer tube so that the oxygen molecules are converted into ozone to be injected into the drainage. Active oxygen is released from the ozone and the polymer in the drainage is decomposed and decolored. This reference does not have the starting waste sludge as required by the present claims or suggest that potable water could be obtained by the present steps which include two treatment steps of simultaneously ozonizing and irradiating the first filtrate directly with a specific ray. Therefore, Ichiki et al in combination with Lloyd does not present a showing of prima facie obviousness under 35 USC 103(a) with respect to the presently claimed invention.

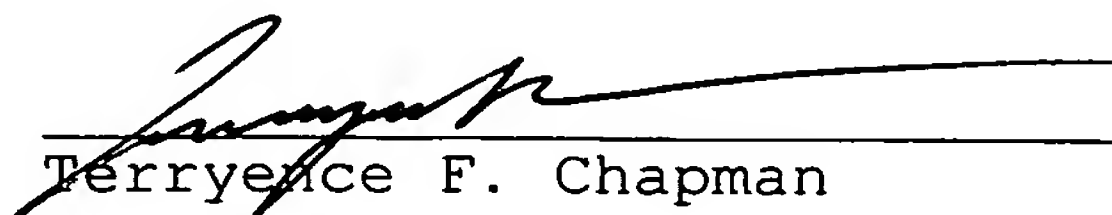
The Mahler et al reference discloses a system for irradiating flowable material in which inlet and outlet conduits introduce the flowable material into and discharge it from an irradiation chamber which includes a spiral passage for guiding the flowable material in a spiral path from the inlet to the outlet conduit. However, this reference has no suggestion as to how one would simultaneously treat the flowable material with ozone while irradiating it nor does it disclose the provision of the specific ray lamps in parallel. Additionally, this reference does not suggest that anything advantageous would be obtained by conducting two treatment steps of a contaminated liquid being simultaneously treated with ozone and a specific ray. Therefore, Mahler et al in combination with either of the previously discussed references does not present a showing of prima facie obviousness under 35 USC 103(a).

Although the references cited by the Examiner do not present a showing of prima facie obviousness under 35 USC 103(a), objective evidence is of record in the present application which is more than sufficient to rebut any proper showing of prima facie obviousness under 35 USC 103(a).

As shown by the Example contained in the present specification, a waste stream from a pig farm can be treated by the present invention to produce an effluent which more than complies with current pollution control laws. Moreover, as discussed on page 8, lines 9-14 of the present application, by conducting first and second treatment steps, the treatment reaction is accelerated and the treating time and treating ability are improved. That is, if the first treatment covers the second treatment, the time for treatment is six hours longer and the clarification ratio is not as good. This is clearly unexpected in light of the prior art cited by the Examiner and further establishes the patentability of the presently claimed invention thereover.

The Examiner is respectfully requested to reconsider the present application and to pass it to issue.

Respectfully submitted,

  
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Encl: Replacement Abstract  
Clean Substitute Specification  
Marked-Up Substitute Specification  
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